CLAIMS

We claim:

1. A method for generating parametric audio output based on interaction of multiple ultrasonic frequencies within air as a nonlinear medium, said method comprising the steps of:

a) generating an electronic signal comprising at least two ultrasonic signals having a difference in value which falls within an audio frequency range;

sub a8 b) transferring the electronic signal to an electro acoustical transducer diaphragm which couples directly with the air as part of a single stage energy conversion process;

c) converting the electronic signal at the diaphragm directly to mechanical displacement as a driver member of a parametric speaker;

d) mechanically emitting the at least two ultrasonic signals from the diaphragm into the air as ultrasonic compression waves; and

e) interacting the ultrasonic compression waves within the air to generate the parametric audio output.

2. A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to an electrostatic transducer.

3. A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to an electret transducer.

4. A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm as the electro acoustical transducer diaphragm.

sub a9 ~~5. A method as defined in claim 1, wherein step b) comprises the more specific step of transferring~~

the electronic signal to a electro thermal mechanical film diaphragm as the electro acoustical transducer diaphragm.

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6. A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a planar magnetic film diaphragm as the electro acoustical transducer diaphragm.

7. A method as defined in claim 2, wherein step b) comprises the more specific step of transferring the electronic signal to an electrostatic backplate having a surface configuration comprising circular v grooves operable as a stator member with respect to the diaphragm.

8. A method as defined in claim 4, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm having a configuration of a rectified sine form.

9. A method as defined in claim 8, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm which is supported by a backplate having a configuration of a rectified sine form.

10. A method as defined in claim 4, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm having a configuration of a sinusoidal form.

11. A method as defined in claim 10, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm which is supported by a backplate having a configuration of a sinusoidal form.

12. A method as defined in claim 1, further comprising the step of selecting a transducer diaphragm having a dimension greater than the wavelength of the ultrasonic frequencies at their lowest value.

13. A method as defined in claim 1, further comprising the step of selecting a transducer diaphragm having a dimension greater than ten times the wavelength of the ultrasonic frequencies at their lowest value.

14. A method as defined in claim 4, further comprising the step of selecting a transducer diaphragm having a convex curvature which generates a diffuse radiation pattern for emission of the parametric output.

15. A method as defined in claim 4, further comprising the step of selecting a transducer diaphragm having a concave curvature which generates a focused radiation pattern for emission of the parametric output.

16. A method as defined in claim 4, further comprising the step of selecting a transducer diaphragm having a dipolar propagation mode for which generates a diffuse radiation pattern for emission of the parametric output.

17. A method as defined in claim 4, further comprising the step of spacing the transducer diaphragm a quarter wave distance from a supporting backplate.

18. A method as defined in claim 1, further comprising the step of selecting a transducer diaphragm having a one-half wave length distance between between peak to trough of a sinusoidal form for the diaphragm.

sub a/10 ~~19. A method as defined in claim 4, further comprising the step of providing a dimpled transducer~~

diaphragm comprising a monolithic sheet of film having ~~closely spaced concave dimples in closely spaced, side by side array which generates~~ a substantially uniform and homogenous radiation pattern ~~for emission~~ of the parametric output across the surface of the diaphragm.

20. A speaker device for generating parametric audio output based on interaction of multiple ultrasonic frequencies within air as a nonlinear medium, said device comprising:

a) a parametric signal generation system including an ultrasonic signal source, an audio signal source, and a modulating device coupled to the ultrasonic and audio signal sources for mixing the ultrasonic and audio signals for generating a resultant electronic signal comprising at least two ultrasonic signals having a difference in value which falls within an audio frequency range;

b) an eelectro acoustical transducer diaphragm coupled to the parametric signal generation system which also couples directly with the air as part of a single stage energy conversion process; and

c) support structure for positioning and stabilizing the diaphragm to enable mechanical displacement of the diaphragm as a driver member of a parametric speaker.

21. A device as defined in claim 20, wherein the transducer comprises an electrostatic transducer.

22. A method as defined in claim 20, wherein the transducer comprises an electret transducer.

23. A method as defined in claim 20, wherein the transducer comprises a piezo film diaphragm as the electro acoustical transducer diaphragm.

~~24. A method as defined in claim 20, wherein the transducer comprises an electro thermal~~ mechanical film diaphragm as the electro acoustical transducer diaphragm.

25. A method as defined in claim 20, wherein the transducer comprises a magnetic film diaphragm as the electro acoustical transducer diaphragm.